

PRODUCT IMPROVEMENT WITH DIETARY FIBRE



TNO innovation
for life

Addition of fibres to foods is an effective way to improve health benefits of food products. Dietary fibres (DF) are indispensable in gastro-intestinal comfort and general well being. TNO can help you in formulating dietary fibres or prebiotics by establishing the gut-health effect, assessing the effects on the Glycemic Index of the product or by assisting in maintenance of product quality (with respect to processing, taste reformulation, texture or shelf life).

While the average western consumer eats too much fat, salt and sugar, the consumption level of fibres in general is far from the daily amount of 25 g recommended by dietary guidelines. Despite these guidelines and active promotion of fibre consumption by nutrition agencies, many refined low-fiber products are still on the market.

MULTI-FUNCTIONAL RESEARCH

TNO offers a broad array of technologies to assist the industry in developing attractive and healthy fibre-rich products. These include fibre production and modification, analysis and molecular characterization, assessment of specific effects on health and well-being, including analysis of gut microbiota.

NEW FIBRE DEVELOPMENT

In the development of new functional fibres clean label technologies for the modification of fibres is a focus area at TNO. Various technologies are being developed to meet functional properties required by the food industry using non-chemical, clean label approaches. Examples include processes that result in fibers with improved solubility, increased water binding capacity, and enhancement of emulsion stabilizing capacity. These are achieved by using various combinations of temperature, pressure and water activity. The result is the ability to tailor fiber functionality towards specific food product requirements and applications. Examples comprise the development of novel resistant starches including attenuated starches.



APPLICATION OF FIBRES

Addition of fibres to foods may demand specific attention with respect to processing, product quality and shelf life/stability.

In bread, for instance, addition of fibres may lead to lower baking volume, increased dough stickiness longer kneading times and the colour deviation. Thus a number of processing and sensory aspects needs attention. TNO has successfully supported baking industry in tackling these challenges by combining expertise in processing technology and ingredient interactions.

This is done using food model systems for products like bread and dairy products like yoghurt or beverages. These TNO food model systems are not only used for fibre enrichment of products but also for fat reduction programmes in which fibres can be used as an alternative to replace fat.

HEALTH BENEFITS OF FIBRES

Depending on the developmental stage and the intended application of the fibre, health benefits can be assessed using various *in vitro* and *in vivo* platforms operated at TNO. Fat and cholesterol binding properties can be assessed using the *in vitro* digestion system TIM-1. Effects on gut microbiota (including pathogens) can be studied in micro-titer plates or in the colon-simulating model (TIM-2). TNO also offers a new rapid screening platform to identify fibres with prebiotic properties. The Functional

Ingredient Screen provides a complete understanding of both the chemical structure of components and their effects on the intestinal flora. It's empowered by the combination of technologies from the fields of analytical chemistry, physiology, microbiology and molecular biology.

In a next stage, animal models can be used to study short-term effects health like glucose response, weight gain and lipid metabolism or longer term effects like reduction of local or systemic inflammation, metabolic syndrome and atherosclerosis. Effects of fibres on mineral uptake can be studied using dual isotope labelling. Human volunteer studies can be performed for most of these health benefits. In addition, effects of fibres on gut functionality can be addressed. TNO's newest approach to study health improvement includes application of challenge tests, by exposing animals or humans to a short term disturbance of homeostasis and monitoring return of biomarkers to normal values. TNO applies advanced analytics (including various omics platforms and pyrosequencing) and bioinformatics to identify relevant physiological effects. Regulatory consultancy is offered to define best strategies for building health claim dossiers.

TNO.NL

HEALTHY LIVING

TNO initiates technological and societal innovation for healthy living and a dynamic society.

TNO
Utrechtseweg 48
P.O. Box 360
3700 AJ Zeist
The Netherlands

Mr. Joost Blankestijn
P +31 (0)8886 61693
E joost.blankestijn@tno.nl

North America
Mr. Mark Posno
P +1 617 916 52 38
E mark.posno@tno.nl